RUST Rust Environment & Infrastructure Inc.

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April 24, 1996

Ms. Linda White, P.E.
Technical Project Manager
U.S. Army Corps of Engineers - Omaha District
Attn: CEMRO-ED-EA (White)
215 North 17th Street
Omaha, Nebraska 68102-4978

Re: Letter Work Plan for Surface Water and Sediment Sampling at Landfills 2, 5, and 6
Rust Project No. 89855.500

Dear Ms. White:

Rust Environment & Infrastructure (Rust) is pleased to provide this letter work plan for surface water and sediment sampling activities at Landfills 2, 5, and 6. This plan was prepared in response to comments provided by the Colorado Department of Public Health and Environment (CDPHE). The CDPHE comments were provided in four separate letters dated April 16 through April 18, 1996. The following paragraphs describe the plans for surface water and sediment sampling at Landfills 2, 5, and 6. Figures 1, 2, and 3 show the approximate surface water and sediment sample locations for Landfills 2, 5, and 6, respectively.

SURFACE WATER SAMPLES

Two surface water samples will be collected from B Ditch at Landfill 5 in the locations shown on Figure 2. Since surface water flow in the ditches at Landfills 2 and 6 is intermittent, surface water samples may be collected. Approximately four surface water samples will be collected at Landfill 2 in the locations shown on Figure 1, if surface water is present. Approximately four surface water samples will also be collected at Landfill 6 in the locations shown on Figure 3, if surface water is present.

When sampling flowing bodies of water, downstream samples will be collected before upstream stations to avoid agitation of the water flow and the potential introduction of suspended sediment into subsequent samples. Direct dipping of the sample container into the water to be sampled is desirable.

Surface water samples that are to be preserved with chemical additives will be collected using a properly decontaminated dipper, filtered (if so specified), and then poured directly into the sample container already containing the proper chemical preservative. Teflon® or stainless steel vessels may be used to collect samples from surface waters. Teflon® or stainless steel dippers or vessels will be properly decontaminated between uses.

Surface water samples will be analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) using EPA Methods 8260 and 8270, respectively. Surface water samples will be analyzed for dissolved metals including: antimony, cadmium, chromium, copper, manganese, and barium using EPA Method 6010; arsenic, lead, and selenium using appropriate 7000 series graphite furnace AA methods; and mercury using EPA Method 7470. In addition, the surface water samples will be analyzed for chlorinated pesticides using EPA Method 8080 and chlorinated herbicides using EPA Method 8150 in accordance with CDPHE's comments. Surface water samples will also be analyzed for general water quality including: total dissolved solids (TDS) using EPA Method 160.1; total suspended solids (TSS) using EPA Method 160.2; common anions (Cl, SO_4, NO_3, and SO_2) using EPA Method 300.0; biochemical oxygen demand (BOD) using EPA Method 405.1; chemical oxygen demand (COD) using EPA Method 410.4; and total organic carbon (TOC) using EPA Method 415.1. The samples for metals and inorganics analyses will be field filtered by passing the water through a 0.45 micron disposable filter.

Surface water sample analyses are summarized on Table 1. Table 2 provides specifications for the appropriate sample containers, sample volumes, preservation techniques, and holding times. All samples will be immediately placed on ice in a cooler and preserved at 4°C. Samples will be shipped to Quanterra Environmental Services for analysis. Sample labeling, handling, and shipping techniques are discussed in the Field and Laboratory Procedures Manual, and all samples will be subject to appropriate chain-of-custody (COC) protocol.

SEDIMENT SAMPLES

Sediment samples are defined to include only the upper 6 inches of strata which has been carried or emplaced by surface water. The sediments to be sampled may or may not be submerged depending on the presence of surface water. Samples for VOC analysis will be placed in sample containers as soon after retrieval of the sample as possible and before any other sampling or logging is performed on the sample. Two sediment samples will be collected at Landfill 5, and four sediment samples will be collected at each of Landfills 2 and 6. Sediment samples will be collected in approximately the same locations as the surface water samples described above and as shown on Figures 1, 2, and 3.

Since the water is shallow or may not be present, the easiest and most acceptable way to collect a sediment sample is to scoop the sediment using a stainless steel spoon or grain scoop. When surface water is present, samples are collected by wading into the stream or pond and scooping the sample along the stream bottom in the upstream direction while facing upstream.

Sediment samples will be analyzed for VOCs and SVOCs using EPA Methods 8260 and 8270, respectively. Sediment samples will be analyzed for metals including: antimony, cadmium, chromium, copper, manganese, and barium using EPA Method 6010; arsenic, lead, and selenium using appropriate 7000 series graphite furnace AA methods; and mercury using EPA Method 7470. The sediment samples will also be analyzed for chlorinated pesticides using EPA Method 8080 and chlorinated herbicides using EPA Method 8150.

Sediment sample analyses are summarized on Table 1. Table 2 provides specifications for the appropriate sample containers, sample volumes, preservation techniques, and holding times. All samples will be immediately placed on ice in a cooler and preserved at 4°C. Samples will be shipped to Quanterra Environmental Services for analysis. Sample labeling, handling, and shipping techniques are discussed in the Field and Laboratory Procedures Manual, and all samples will be subject to appropriate COC protocol.

FIELD PROCEDURES

Quality control analysis will include method blanks, surrogates, matrix spike and matrix spike duplicates (MS/MSDs), and field duplicates in accordance with the Field and Laboratory Procedures Manual. Five percent of the total number of samples (one sediment and surface water sample) will be selected by Rust for MS/MSD analysis for VOCs and SVOCs. Field duplicates will also be collected and analyzed for 5 percent of the total number of samples (one sediment and surface water sample). Instrument calibration will also be conducted as described in the Field and Laboratory Procedures Manual.

Health and safety procedures employed during the surface water and sediment sampling events will be consistent with the Revised Sampling and Analysis Plan for Remedial Design Landfills 2 (FTC-006), 3 (FTC-007), 5 (FTC-009), and 6 (FTC-010), and Vapor Degreasing/Spray Jet Washers (FTC-058).

We are planning to collect these samples on Friday, April 26, 1996. If you have any questions, please contact Mark Scott or myself.

Sincerely,
RUST ENVIRONMENT & INFRASTRUCTURE

John A. England, P.E.
Project Manager

Attachments

cc: Jim Henderson, DECAM
Mark Scott, P.E.
File

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TABLES

TABLE 1
SURFACE WATER AND SEDIMENT SAMPLING SUMMARY
LANDFILLS 2, 5, AND 6

Sample Type	Volatile Organic Compounds EPA Method 8260	Semivolatile Organic Compounds EPA Method 8270	Metals (Cd, Cr, Ag, Ba, Sb, Mn) EPA Method 6010	Metals (As, Pb, Se) EPA Method 7000	Mercury EPA Method 7470	Chlorinated Pesticides EPA Method 8080	Chlorinated Herbicides EPA Method 8150	Water Quality EPA Methods 160.1, 160.2, 300.0, 405.1, 410.4, 415.1
Landfill 2								
Surface Water*	4	4	4	4	4	4	4	4
Sediment	4	4	4	4	4	4	4	--
Landfill 5								
Surface Water	2	2	2	2	2	2	2	2
Sediment	2	2	2	2	2	2	2	--
Landfill 6								
Surface Water*	4	4	4	4	4	4	4	4
Sediment	4	4	4	4	4	4	4	--
Field Duplicate								
Surface Water	1	1	1	1	1	1	1	--
Sediment	1	1	1	1	1	1	1	--
Trip Blank (Quanterra)	3	--	--	--	--	--	--	--

TABLE 1
SURFACE WATER AND SEDIMENT SAMPLING SUMMARY
LANDFILLS 2, 5, AND 6
Page 2 of 2

Sample Type	Volatile Organic Compounds EPA Method 8260	Semivolatile Organic Compounds EPA Method 8270	Metals (Cd, Cr, Ag, Ba, Sb, Mn) EPA Method 6010	Metals (As, Pb, Se) EPA Method 7000	Mercury EPA Method 7470	Chlorinated Pesticides EPA Method 8080	Chlorinated Herbicides EPA Method 8150	Water Quality EPA Methods 160.1, 160.2, 300.0, 405.1, 410.4, 415.1
MS/MSD								
Surface Water	1	1	1	1	1	1	1	--
Sediment	1	1	1	1	1	1	1	--
Split (MRD Lab)								
Surface Water	1	1	1	1	1	1	1	--
Sediment	1	1	1	1	1	1	1	--
Trip Blank (MRD Lab)	1	--	--	--	--	--	--	--

MRD USACE Missouri River Division Laboratory
MS Matrix Spike
MSD Matrix Spike Duplicate
Note: Water Quality includes TDS, TSS, Common Anions (Cl, SO_4, NO_3, NO_2), BOD, COD, and TOC.
* Surface water samples will be collected only if flowing surface water is present.

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TABLE 2
SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIME SPECIFICATIONS
LANDFILLS 2, 5, AND 6 SURFACE WATER AND SEDIMENT SAMPLING
FORT CARSON, COLORADO
Page 1 of 2

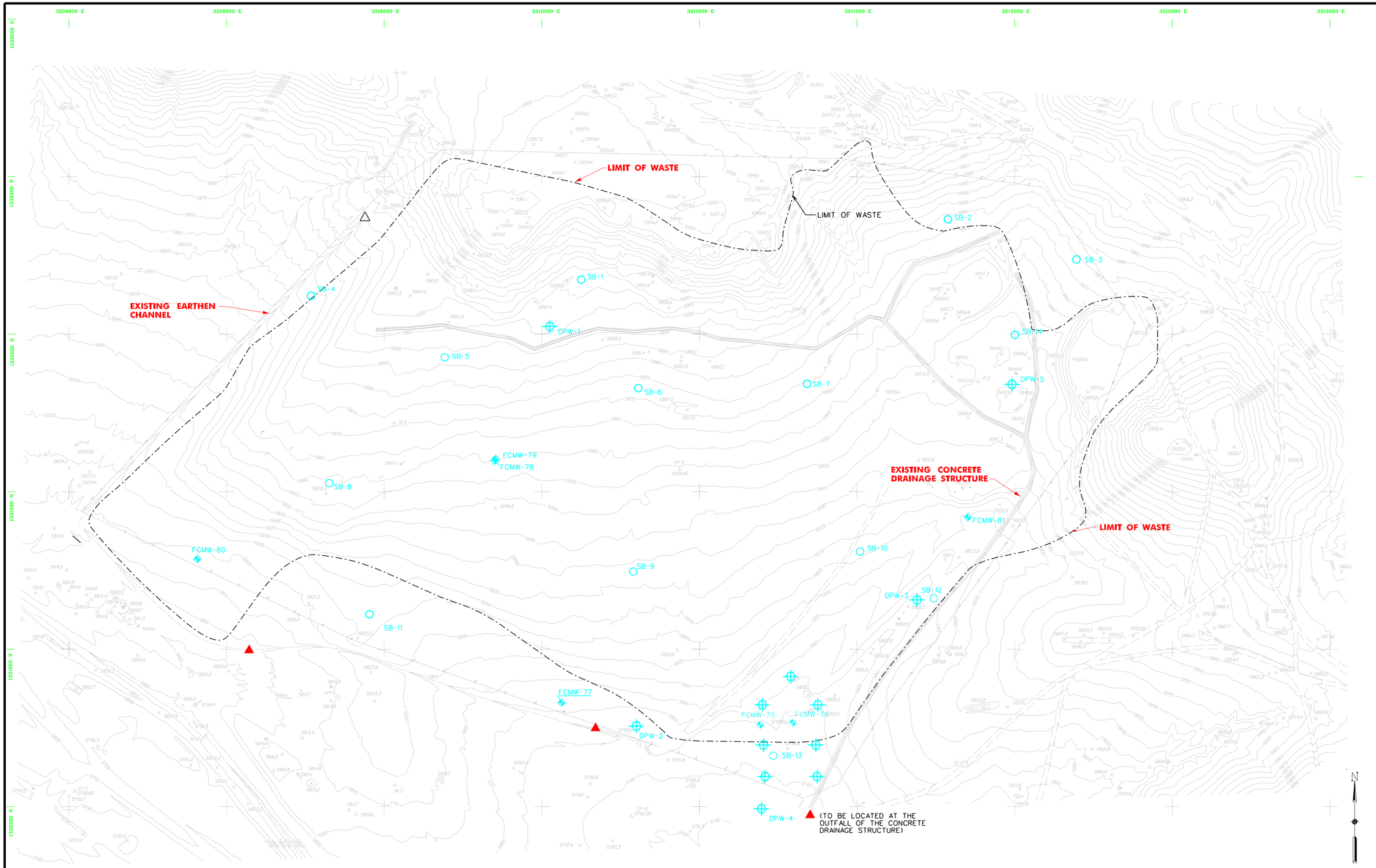
			Volume Required		Preservation		Maximum Holding Times[b]	
Method	**Parameter**	**Container**	**Water (mL)**	**Soil (g)**	**Water**	**Soil**	**Water (days)**	**Soil (days)**
Organic Methods								
8260	Volatile Organics	G; Teflon® lined septum	4x40	10	4°C;HCL to pH <2[a]	4°C	14	14
8270	Semivolatile Organics	Amber G; Teflon® lined cap	1000	100	4°C	4°C	7/40	14/40
8080	Organochlorine Pesticides	Amber G;Teflon® lined septum	1000	100	4°C	4°C	7/40	7/40
8150	Chlorinated Herbicides	Teflon® lined septum	1000	100	4°C	4°C	7/40	7/40
Inorganic Methods								
7470	Mercury	Plastic	500	10	4°C; HNO_3 to pH<2	4°C	28	28
7000	GFAA Metals (As, Pb, Se)	Plastic	250	100	4°C;HNO_3 to pH<2	4°C	180	180
6010	Metals (Cd, Cr, Ag, Ba, Sb, Mn)	Plastic	1000	100	4°C;HNO_3 to pH<2	4°C	180	180

TABLE 2
SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIME SPECIFICATIONS
LANDFILLS 2, 5, AND 6 SURFACE WATER AND SEDIMENT SAMPLING
FORT CARSON, COLORADO
Page 2 of 2

			Volume Required		Preservation		Maximum Holding Times[b]	
Method	Parameter	Container	Water (mL)	Soil (g)	Water	Soil	Water (days)	Soil (days)
Water Quality								
300.0	Common Anions (Cl, SO_4, NO_3, NO_2)	Polyethylene	500	NA	4°C	NA	28 (Cl, SO_4) 48 hr (NO_3)	NA
405.1	Biochemical Oxygen Demand	Polyethylene	200	NA	4°C	NA	2	NA
410.4	Chemical Oxygen Demand	G	100	NA	4°C, H_2SO_4 to pH<2	NA	28	NA
160.1	Total Dissolved Solids	Polyethylene/ G	250	NA	4°C	NA	7	NA
160.2	Total Suspended Solids	Polyethylene/ G	250	NA	4°C	NA	7	NA
415.1	Total Organic Carbon	G; Teflon® lined septum	250	NA	4°C, H_2SO_4 to pH<2	NA	28	NA

Notes: NA Not applicable.
G Glass
[a] Unpreserved samples will be collected and analyzed in the event that effervescence is observed during sample collection.
[b] Holding times are calculated from the date of collection (7/40=extraction 7 days and analysis 40 days).

FIGURES



LEGEND

- FCMW-81 — LOCATION OF EXISTING MONITORING WELL
- SB-3 — LOCATION OF BORING
- DPW-3 — APPROXIMATE DIRECT PUSH WATER SAMPLING LOCATION
- SURVEY CONTROL POINT
- PROPOSED LOCATION OF SEDIMENT SAMPLES AND SURFACE WATER SAMPLES (IF SURFACE WATER IS PRESENT)

NOTES:

1. HORIZONTAL COORDINATES ARE MODIFIED STATE PLANE COORDINATES COLORADO CENTRAL ZONE BASED ON NAD83 WITH A DATUM ADJUSTMENT FACTOR OF 1.00025853 ELEVATIONS SHOWN ARE MEAN SEA LEVEL NAVD88 CONTROL BY MONTGOMER-PHILLIPS, INC.
2. NO KNOWN UTILITIES EXIST WITHIN THE AREA OF THE DRAWING SHOWN.

DATE OF PHOTOGRAPHY: DECEMBER 14, 1994

PHOTO SCALE: 1:3600'

SCALE: 1 INCH = 200 FEET

100' 0 100'

$$-THINK VALUE ENGINEERING-$$

Revisions

Symbol	Descriptions	Date	Approved

RUST ENVIRONMENT & INFRASTRUCTURE
DENVER ENVIRONMENTAL DIVISION

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
OMAHA, NEBRASKA

Designed by: M.W.
Drawn by: A.S.
Checked by: M.Y.
Reviewed by: J.E.
Submitted by: Chief: Section

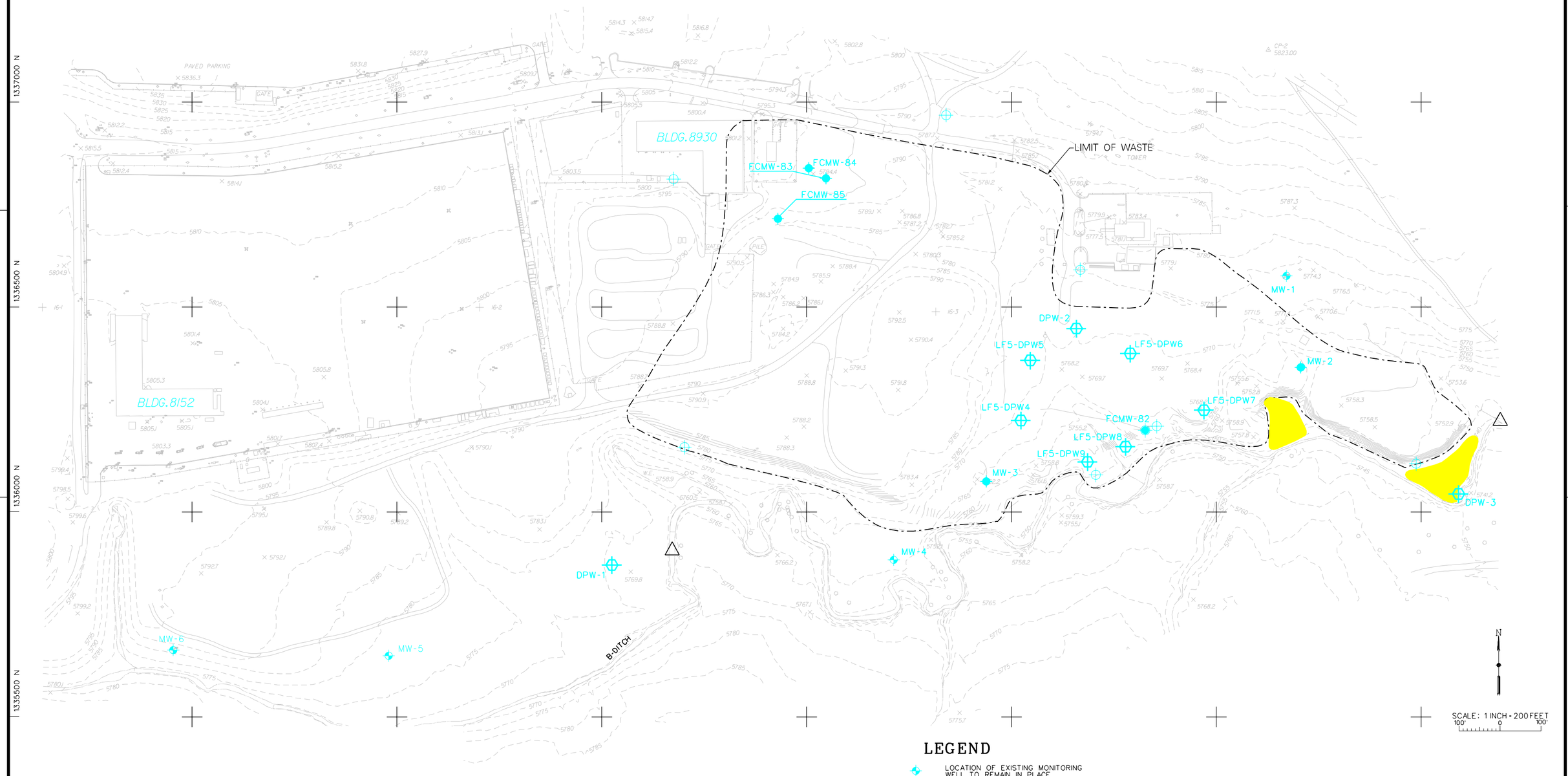
FORT CARSON COLORADO

FIGURE 1

PROPOSED SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

LANDFILL No.2 (FTC-006)

Plot Scale Ratio:
Design File: SURFWAT2.DGN
Date: APRIL 1996
Spec.No.:
Drawing Code: F 421-90-02
Contract No.: DACW 45-93-D-0007
Sheet reference number:



LEGEND

MW-5 — LOCATION OF EXISTING MONITORING WELL TO REMAIN IN PLACE

APPROXIMATE LOCATION OF MONITORING WELL TO BE INSTALLED AFTER CAP INSTALLATION (LOCATION OF WELLS NEAR FOMW-82 WILL BE BASED ON DIRECT PUSH SAMPLES)

LOCATION OF ABANDONED MONITORING WELL

APPROXIMATE DIRECT PUSH WATER SAMPLE LOCATION

PROPOSED LOCATION OF SURFACE WATER AND SEDIMENT SAMPLES

CONTOUR INTERVAL IS 1 FOOT

NOTES:

1. HORIZONTAL COORDINATES ARE MODIFIED STATE PLANE COORDINATES COLORADO CENTRAL ZONE BASED ON NAD83 WITH A DATUM ADJUSTMENT FACTOR OF 1.00026853 ELEVATIONS SHOWN ARE MEAN SEA LEVEL NAVD88 CONTROL BY MONTOGMERY-PHILLIPS, INC.

DATE OF PHOTOGRAPHY: DECEMBER 14, 1994

PHOTO SCALE: 1:3600'

$$ – THINK VALUE ENGINEERING – $$

Revisions

Symbol	Descriptions	Date	Approved

RUST ENVIRONMENT & INFRASTRUCTURE

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
OMAHA, NEBRASKA

Designed by: MW
Drawn by: AS
Checked by: MY
Reviewed by: JE
Submitted by:

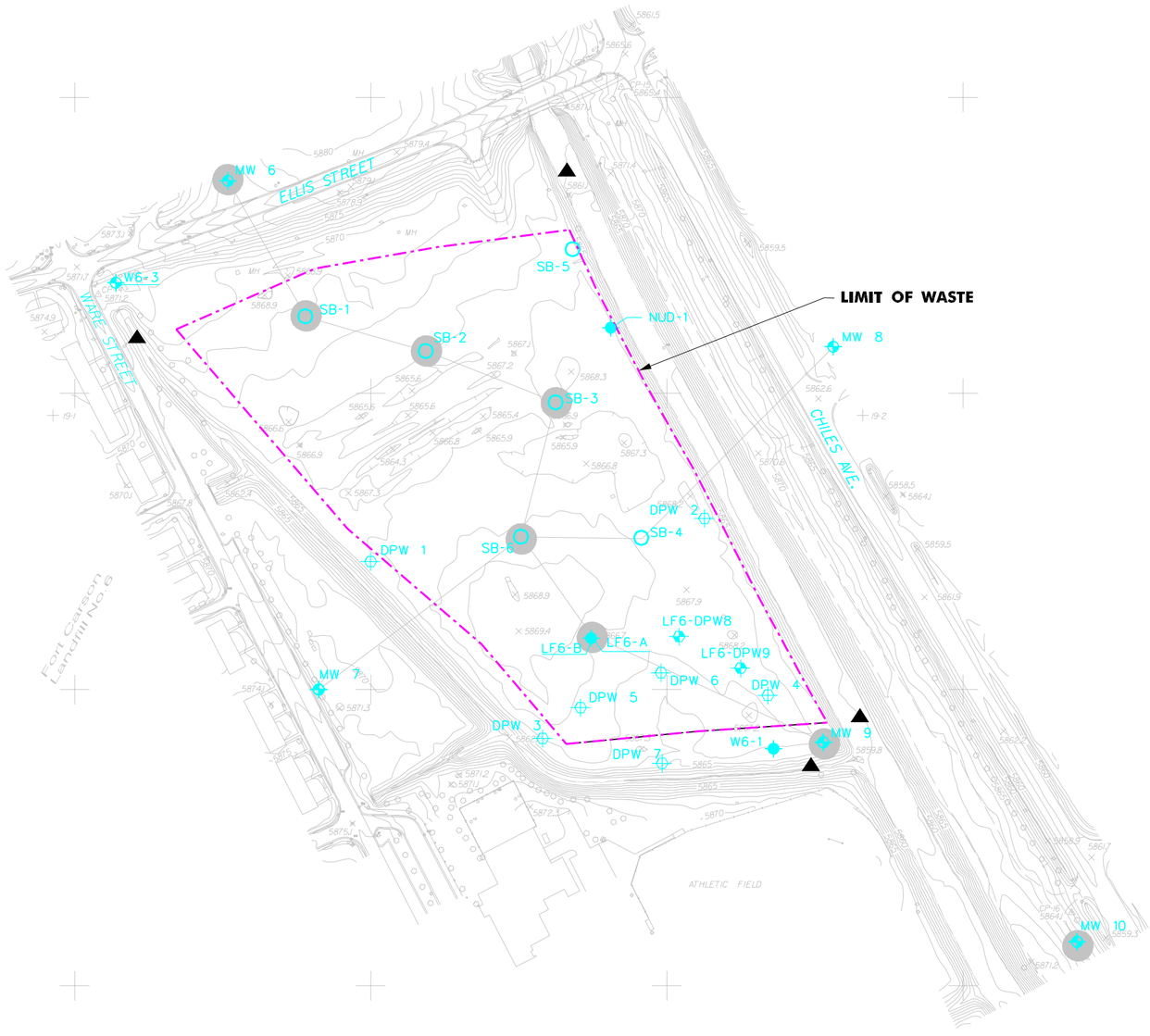
FORT CARSON — FIGURE 2 — COLORADO

PROPOSED SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

LANDFILL No.5 (FTC-009)

Plot Scale Ratio: AS SHOWN
Design File: SURFWAT5.DGN
Date: APRIL 1996
Spec. No.: DACW 45
Contract No.: DACW 45
Drawing Code:
Sheet reference number:

COMPUTER AIDED DESIGN & DRAFTING



LEGEND

- LOCATION OF EXISTING MONITORING WELL
- LOCATION OF ABANDONED MONITORING WELL
- BORING LOCATION
- DIRECT PUSH WATER SAMPLE LOCATION
- SURVEY CONTROL POINT
- PROPOSED LOCATION OF SEDIMENT SAMPLES AND SURFACE WATER SAMPLE (IF SURFACE WATER IS PRESENT)
- LF6-DPW8 — PROPOSED DIRECT PUSH LOCATIONS

NOTE:

1. HORIZONTAL COORDINATES ARE MODIFIED STATE PLANE COORDINATES COLORADO CENTRAL ZONE BASED ON NAD83 WITH A DATUM ADJUSTMENT FACTOR OF 1.00026853
   ELEVATIONS SHOWN ARE MEAN SEA LEVEL NAVD88
   CONTROL BY MONTGOMERY-PHILLIPS, INC.

DATE OF PHOTOGRAPHY: DECEMBER 14, 1994

PHOTO SCALE: 1:3960'

N

SCALE
100' 0 100'

$$ - THINK VALUE ENGINEERING - $$

Revisions

Symbol	Descriptions	Date	Approved

RUST ENVIRONMENT & INFRASTRUCTURE
MOUNTAIN DIVISION

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
OMAHA, NEBRASKA

Designed by: MW
Drawn by: AS
Checked by: MY
Reviewed by: JE
Submitted by:

FORT CARSON COLORADO

FIGURE 3

PROPOSED SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS

LANDFILL 6 (FTC-010)

Plot Scale Ratio: AS SHOWN
Design File: SURFWAT.DGN
Date: APRIL 1996
Spec. No.: DACW 45
Contract No.: DACW 45
Drawing Code:
Sheet reference number:

COMPUTER AIDED DESIGN & DRAFTING